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Attorney Docket No. 2950.35US01

APPEAL BRIEF TRANSMITTAL

In re the application of:

	Kambe et al.	Confirmation No.: 8988
Application No.:	09/558,266	Examiner: Lawrence D. Ferguson
Filed:	April 25, 2000	Group Art Unit: 1774
For:	SELF-ASSEMBLED STRUCTURES	

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith, in triplicate, is the Appeal Brief, Appendices A (4 pgs), B (1 pg), C (13 pgs) and D (16 pgs), in the above-identified application, with respect to the Notice of Appeal filed on July 26, 2004.

- [X] Applicant(s) is/are entitled to small entity status in accordance with 37 CFR 1.27.
- [X] A check in the amount of [] \$330.00 (large entity) [X] \$165.00 (small entity) to cover the filing fee.

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Respectfully submitted,

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Please grant any extension of time necessary for entry; charge any fee due to Deposit Account No. 16-0631.

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

Attorney Docket No.: 2950.35US01

Kambe et al.

Confirmation No.: 8988

Application No.: 09/558,266

Examiner: L. Furguson

Filed: April 25, 2000

Group Art Unit: 1774

For: SELF-ASSEMBLED STRUCTURES

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPEAL BRIEF FOR APPELLANTS

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from the Final Office Action dated March 31, 2004, in which claims 1, 8-10, 12, 14-16, 41-50 and 53 were finally rejected. A Notice of Appeal was filed on July 26, 2003.

REAL PARTY IN INTEREST

NanoGram Corporation, a corporation organized under the laws of the state of Delaware, and having offices at 2911 Zanker Road, San Jose, California, has acquired the entire right, title and interest in and to the invention, the application, and any and all patents to be obtained therefore, as per the Assignment, recorded at Reel 0109261, Frame 0777 from the inventors to NeoPhotonics Corporation and an assignment from NeoPhotonics Corporation to NanoGram Corporation, recorded at Reel 013957, Frame 0076. Note that NeoPhotonics Corporation was

formerly called NanoGram Corporation, and the present NanoGram Corporation was previously a wholly owned subsidiary of NeoPhotonics Corporation following the formal name change. The present NanoGram Corporation is now an independent corporation, but affiliated with the earlier NanoGram Corporation, now named NeoPhotonics Corporation.

RELATED APPEALS AND INTERFERENCES

Appellants are aware of no related appeals.

STATUS OF THE CLAIMS

Claims 1, 8-10, 12, 14-16, 41-50 and 53 stand rejected. Claims 4-7, 11, 13 and 51-52 are objected to for depending on a rejected base claim and are otherwise allowable. Claims 2, 3 and 17-40 have been canceled. The pending claims are listed in Appendix A.

STATUS OF AMENDMENTS

All amendments have been entered.

SUMMARY OF INVENTION

The present invention relates to the organization of self-assembled structures along or within a surface. See, for example, specification at page 4, lines 7-20. Self-assembly techniques take advantage of molecular recognition properties, such as commingling, key-lock relationships and guest-host interactions. Page 4, lines 7-12. The organization of the self-assembled structures provides for the formation of devices, which have the potential of being integrated into systems. For example, page 7, lines 17-22. Thus, the claimed materials have two levels or organization. At a larger level of organization, domains are organized at selected location for the placement of a self-assembled structure. At a finer scale of organization, within

one of the self-assembled locations is a self-assembled structure. In organizing a plurality of self-assembled domains, the different domains may or may not have the same composition and/or self-assembled structure within the domain. For example, page 7, lines 4-22 and page 38, line 28 to page 39, line 23. While the present claims are only directed to the structures themselves, Appellants' specification describes a range of techniques for forming the organized domains within which there are self-assembled structures. For example, page 45, line 32 to page 47, line 28.

Self-assembly involves interactions between a substrate and adjacent materials that result in inherent formation of a layer of the material on the substrate. For example, page 48, line 16 to page 54, line 3. Appellants' pending claims are directed to two aspects of their invention. In some embodiments, Appellants' invention is built upon the discovery that boundary forming techniques can be combined with self-assembly approaches to form complex structures with integrated self-assembled domains. The combination of boundary forming techniques with self-assembly is a powerful combination for the formation of complex structures. Page 39, line 33 to page 40, line 14.

Self-assembly techniques inherently form layered structures with a layer or a portion of a layer formed on a substrate. Thus, an entire layer generally is formed by a self-assembly process, except, for example, as altered using localization approaches described by Appellants. As described by Appellants, a second level of structure is introduced by a localization technique. This approach results in the plurality of self-assembled structures in localized islands, as claimed by Appellants in claims 1, 4-14 and 41-44. These localized structures are shown schematically in Figures 7-15. The localization techniques introduce the second level of structure. Fig. 7 is reproduced and annotated in Appendix B to show one particular group of localized self-assembled structures in an integrated assembly.

In some embodiments described in Appellants' specification, the self-assembly approach uses nanoparticles, which can be highly uniform with average particle sizes in selected ranges. Appellants' specification has an extensive discussion of the formation of suitable nanoparticles formed using laser pyrolysis. This ability to form self-assembled structures with nanoparticles of metal/silicon oxides, metal/silicon carbides, metal/silicon nitrides and elemental metals is the subject of claims 15, 16, 45-53.

ISSUES

1. Are claims 1, 8-10, 12 and 14 obvious under 35 U.S.C. §103(a) over U.S. Patent 5,352,485 to DeGuire et al.?
2. Are claims 15, 16, 41-50 and 53 obvious under 35 U.S.C. §103(a) over U.S. Patent 5,751,018 to Alivisatos et al.?

GROUPING OF CLAIMS

The pending claims fall within 8 groups.

Claims 1, 8-10, 12 and 14 fall within a first group directed to a material having a structure comprising a plurality of self-assembled structures.

Claims 15, 46-48 and 50 fall within a second group directed to a self-assembled formation of inorganic nanoparticles.

Claim 16 and 45 fall within a third group directed to a self-assembled formation of uniform inorganic nanoparticles.

Claims 41-42 fall within a fourth claim group directed to a plurality of self-assembled structures with specific features of the particles.

Claim 43 falls within a fifth claim group directed to a plurality of self-assembled structures with an ordered array of particles.

Claim 44 falls within a sixth group directed to a material having a plurality of self-assembled structures located along different layers.

Claim 49 falls within a seventh group directed to a self-assembled formation of inorganic nanoparticles integrated into an integrated assembly.

Claim 53 falls within a ninth group directed to a self-assembled formation of inorganic nanoparticles having a photonic band gap.

ARGUMENT

I. LEGAL BACKGROUND - OBVIOUSNESS

1. The Examiner Bears The Burden Of Demonstrating Obviousness.

The Appellants note that the patent office has the burden of persuasion in showing that the Appellants are not entitled to a patent. "[T]he conclusion of obviousness vel non is based on the preponderance of evidence and argument in the record." In re Oetiker, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). The patent office has the ultimate burden of persuasion in establishing that an applicant is not entitled to a patent. Id. at 1447, concurring opinion of Judge Plager. **"The only determinative issue is whether the record as a whole supports the legal conclusion that the invention would have been obvious."** Id.

"In rejecting claims under 35 U.S.C. §103, the examiner bears the initial burden of presenting a prima facie case of obviousness." In re Rijckaert, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). Prima facie obviousness is not established if all the elements of the rejected claim are not disclosed or suggested in the cited art. In re Ochiai, 37 USPQ 1127, 1131 (Fed. Cir. 1995). ("The test for obviousness *vel non* is statutory. It requires that one compare the claim's 'subject matter as a whole' with the prior art 'to which said subject matter pertains.'"). **"It is impermissible, however, to simply engage in a hindsight reconstruction of the claimed invention, using applicant's**

structure as a template and selecting elements from references to fill the gaps.” In re Gorman, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991)(emphasis added).

If the Examiner fails to establish a prima facie case of obviousness, the obviousness rejection must be withdrawn as a matter of law. In re Ochiai, 37 USPQ at 1131 (“**When the references cited by the examiner fail to establish a prima facie case of obviousness, the rejection is improper and will be overturned.**” Emphasis added.).

2. Differences Between The Scope Of The Prior Art And The Claimed Invention Must Be Evaluated

The two initial factual determinations under a Graham analysis are (A) Determining the scope and content of the prior art and (B) Ascertaining the differences between the prior art and the claims at issue. See MPEP 2141 citing Graham v. John Deere, 383 U.S. 1, 148 USPQ 459 (1966). In evaluating the differences between the prior art and the claimed invention, the invention as a whole must be considered. See MPEP 2141.02 citing Stratoflex, Inc. v. Aeroquip Corp. 218 USPQ 871 (Fed. Cir. 1983). Similarly, a prior art reference must be considered “as a whole, including portions that would lead away from the claimed invention.” See MPEP 2141.02 (emphasis in original) citing W. L. Gore & Associates, Inc. v. Garlock, Inc., 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

3. There Must Be Motivation In The Art To Modify The Teachings Of the Cited References

The motivation, or suggestion, to modify the teachings of a reference must be either explicitly or implicitly in the references or knowledge “generally available to one of ordinary skill in the art.” See, MPEP § 2143.01. Furthermore, “[t]he test for an implicit showing [of motivation] is what the combined teachings, knowledge of one of ordinary skill in the art, and

nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." See, MPEP §2143.01 (quoting *In re Kotzab*, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000)).

Referring to MPEP 2143.01, it is well established that **"Fact that References Can Be Combined Or Modified Is Not Sufficient To Establish *Prima Facie* Obviousness."** Furthermore, referring to MPEP 2143 "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be both found in the prior art, and not based on applicant's disclosure." Citing *In re Vaeck*.

The Federal Circuit has provided considerable guidance on establishing obviousness of a claim. "Our case law makes clear that the best defense against hindsight-based obviousness analysis is the rigorous application of the requirement of a teaching or motivation to combine the prior art references." *Ecolochem Inc. v. Southern Edison*, 56 USPQ2d 1065, 1073 (Fed. Cir. 2000). "Therefore, '[w]hen determining the patentability of a claimed invention which combines two known elements, 'the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.' " *Id.* (quoting *In re Beattie*, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992)(quoting *Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick Co.*, 221 USPQ 481, 488 (Fed. Cir. 1984))). "The test is not whether one device can be an appropriate substitute for another." *Ruiz v. A.B. Chance Co.*, 57 USPQ2d 1161, 1167 (Fed. Cir. 2000) (emphasis added). In *Ruiz*, the Federal Circuit overturned a district court holding that "it would have been obvious to combine screw anchors and metal brackets, because the need for a bracket 'was apparent.'" *Id.*

The importance of the principle that the prior art itself must suggest the motivation to modify the teachings of a reference was eloquently stated in *In re Rouffet*, 47 USPQ2d 1453, 1458 (Fed. Cir. 1998)(emphasis added):

The Board did not, however, explain what specific understanding or technical principle within the knowledge of one of ordinary skill in the art would have suggested the combination. **Instead the board merely invoked the high level of**

skill in the field of the art. If such a rote invocation could suffice to supply a motivation to combine, the more sophisticated scientific fields would rarely, if ever, experience a patentable technical advance. Instead, in complex scientific fields, the Board could routinely identify the prior art elements in an application, invoke the lofty level of skill, and rest its case for rejection. To counter this potential weakness in the obviousness construct, the suggestion to combine requirement stands as a critical safeguard against hindsight analysis and rote application of the legal test for obviousness.

"There is no suggestion to combine [references] if a reference teaches away from its combination with another source." *Tec Air Inc. v. Denso Manufacturing Michigan Inc.*, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999). **"A 'reference will teach away if it suggests that a line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant."** *Winner International Royalty Corp. v. Wang*, 53 USPQ2d 1580, 1587 (Fed. Cir. 2000)(quoting *In re Gurley*, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994)) (emphasis added). "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley*, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994).

4. The References Must Teach Or Suggest All Of The Claim Elements

Prima facie obviousness is not established if all the elements of the rejected claim are not disclosed or suggested in the cited art. *In re Ochiai*, 37 USPQ 1127, 1131 (Fed. Cir. 1995). ("The test for obviousness *vel non* is statutory. It requires that one compare the claim's 'subject matter as a whole' with the prior art 'to which said subject matter pertains.'"). See also, MPEP 2143.03 "All Claim Limitations Must Be Taught or Suggested," citing *In re Royka*, 180 USPQ 580 (CCPA 1974). "To establish prima facie obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art." MPEP 2143.03.

To establish prima facie obviousness, all the elements of the claim must be taught or suggested by the cited references without the benefit of hindsight based on the applicant's own disclosure. "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to **the insidious effect of a hindsight syndrome** wherein that which only the inventor taught is used against its teacher." W. L. Gore & Assocs., Inc. v. Garlock, Inc., 220 USPQ 303, 312-13 (Fed. Cir. 1983). **"Skill in the art does not act as a bridge over gaps in the substantive presentation of an obviousness case, but instead supplies the primary guarantee of objectivity in the process."** All-Site Corp. v. VSI International Inc., 50 USPQ2d 1161, 1171 (Fed. Cir. 1999)(emphasis added).

5. Obviousness Over A Single Prior Art Reference

Similar principles on motivation to modify the teachings of a reference must be applied when obviousness is based on the teachings of a single cited reference.

In appropriate circumstances, a single prior art reference can render a claim obvious. However, there must be a showing of a suggestion or motivation to modify the teachings of that reference to the claimed invention in order to support the obviousness conclusion. This suggestion or motivation may be derived from the prior art reference itself, from the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved. **Determining whether there is a suggestion or motivation to modify a prior art reference is one aspect of determining the scope and content of the prior art, a fact question subsidiary to the ultimate conclusion of obviousness.**

Sibia Neurosciences, Inc. v. Cadus Pharmaceutical Corp., 55 USPQ2d 1927, 1931 (Fed. Circuit 2000)(internal citations omitted, emphasis added).

6. The References Must Provide A Reasonable Expectation Of Success

While a reference is prior art for all that it teaches, references along with the knowledge of a person of ordinary skill in the art must be enabling to place the invention in the

hands of the public. In re Paulsen, 31 USPQ2d 1671, 1675 (Fed. Cir. 1994). See also In re Donohue, 226 USPQ 619, 621 (Fed. Cir. 1985). "The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that this process should be carried out and would have a reasonable likelihood success, viewed in light of the prior art." Micro Chemical Inc. v. Great Plains Chemical Co., 41 USPQ2d 1238, 1245 (Fed. Cir. 1997)(quoting In Re Dow Chemical Co., 5 USPQ2d 1529, 1531 (Fed. Cir. 1988)).

II. ANALYSIS

A. Rejection Over DeGuire et al.

The Examiner rejected claims 1, 8-10, 12 and 14 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,352,485 to DeGuire et al. (the DeGuire patent). The Examiner cited the DeGuire patent for disclosing an inorganic layer comprising self-assembled monolayers. The Examiner asserted "[a]lthough DeGuire does not explicitly disclose inorganic particles, it would have been obvious to one of ordinary skill in the art to recognize DeGuire obtains inorganic particles because the reference comprises an inorganic layer." With all due respect, the Examiner's assertions have several clear flaws, as explained in detail below. Since the DeGuire patent does not teach or suggest self-assembled structures as claimed, the reference does not render Appellants' claimed invention prima facie obvious. Specifically, the reference does not teach, suggest or motivate several features of the claimed invention. Appellants respectfully request reconsideration of the rejection based on the following comments.

Appellants note that all of the claims rejected over the DeGuire patent are within claim group 1. As noted in the legal summary above, to establish prima facie obviousness the cited references must teach or suggest all of the elements of the claim. Furthermore, the references must motivate the modification of the teachings of the reference to reach Appellants' claimed invention while also providing a reasonable expectation of success. Where the

obviousness rejection is based on a single reference, as here, the motivation must come from the prior art reference itself, from the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved.

In the present case, the DeGuire patent does not teach or suggest all of the features of Appellants' claimed invention and does not provide any motivation whatsoever for the modifications required to reach Appellants' claimed invention. As noted above in under the legal summary, a proper Graham analysis requires a comparison of the teachings of the DeGuire patent with Appellants' claimed invention. This comparison reveals many differences. Specifically, **the DeGuire does not teach or suggest 1) inorganic particles, 2) a plurality of self-assembled structures, 3) localized self-assembled structures, 4) localization of the structures in separate, selected locations, or 5) an integrated assembly of self-assembled structures.** The Examiner has only discussed the lack of teaching of inorganic particles.

With respect to inorganic particles, the Examiner has stated that "it would have been obvious to one of ordinary skill in the art to recognize DeGuire obtains inorganic particles because the reference [sic] comprises an inorganic layer." It is unclear if the Examiner is asserting that all inorganic layers comprise particles since this is clearly not true. The Examiner has not provided any motivation based on the DeGuire patent for inorganic particles. The Examiner has not discussed the other differences at all. Given the nature of the differences, it would not be credible that the motivation for all of these features would come from the knowledge of one of ordinary skill in the art or from the nature of the problem to be solved. If that were true, certainly the Examiner could provide a closer reference **Any one of these differences is a basis for patentability.** These deficiencies are discussed in detail in the following.

First, the DeGuire patent does not teach or suggest particles. As described in MPEP 2143.01 (emphasis in original), it is well established that **"Fact that References Can Be**

Combined Or Modified Is Not Sufficient To Establish *Prima Facie* Obviousness." The Examiner asserts that the teaching of an inorganic layer is the same as teaching inorganic particles, but the basis for this statement has not been explained. As described in the title, abstract and throughout, the DeGuire patent is directed to "films." Films are extended 2-dimensional structures. See column 3, lines 67-68. While the Examiner acknowledges that the DeGuire patent does not teach particles, the Examiner fails to provide any motivation for particles. The DeGuire patent describes the formation of the titanium oxide films in association with a surface. See Fig. 2 and corresponding description. Since the metal oxides are directly formed in association with a surface resulting in a film along the surface, the DeGuire patent teaches away from particles, which necessarily have different geometry from a surface.

Furthermore, the DeGuire patent clearly does not motivate particles. The DeGuire patent teaches the desirability of forming films and the properties of the films. As stated at column 2, lines 47-48, "a uniform and continuous film" is achieved. While thick films were granular with grain sizes of 50 nm, see column 4, lines 24-27, the layers are "densely packed" indicating a continuous structure that cannot be described as particles as individually identifiable structures. As described in the examples, the layers were dense granular films, with primary particle sizes, i.e., grain sizes, having sizes of 100 nm. See, column 8, lines 3-7. The DeGuire patent simple does not teach, suggest or motivate particles, as described and claims by Appellants, and does not provide a reasonable expectation of success with respect to forming particles.

However, assuming arguendo that the DeGuire patent teaches self-assembled inorganic particles, the DeGuire patent still does not come close to rendering Appellants' claimed invention prima facie obvious. Appellants' claims specify a "**plurality of self-assembled structures.**" The Examiner has not even asserted that DeGuire teaches this feature. Then, the Appellants' claims specify "**the structures are localized in separate, selected locations covering**

a portion of the layer in an integrated assembly." Again, the Examiner has not even asserted that the DeGuire patent teaches any of these features. Since the law requires that **all the features** of the claims to be taught or suggested, the Examiner clearly has not even asserted anything close to a case for prima facie obviousness.

The nature of a plurality of self-assembled structures can be seen in Fig. 7 reproduced in Appendix B. The DeGuire patent teaches a uniform layer (e.g., column 2, lines 46-48) which is the antithesis of a plurality of structures. Also, the DeGuire patent does not discuss localizing any structure or selecting locations for the localized structure. Clearly, the DeGuire patent does not describe an integrated assembly since there are no localized structures to integrate. Based on a **large multitude of deficiencies**, this rejection clearly has absolutely no basis under the law. The deficiencies of the DeGuire patent are extreme since **five features** of claim 1 are not taught, suggested or motivated by the reference. Due to the extreme deficiencies of the DeGuire reference with respect to many features of Appellants' claimed invention, this rejection cannot stand.

In summary, the DeGuire patent has fundamental shortcomings with respect to teaching, suggesting, or motivating Appellants' claimed invention. Thus, the DeGuire patent falls far, far short of rendering Appellants' claimed invention prima facie obvious. Appellants respectfully, request withdrawal of the rejection of claims 1, 8-10, 12 and 14 under 35 U.S.C. § 103(a) as being unpatentable over the DeGuire patent.

B. Rejections Over Alivisatos et al.

The Examiner rejected claims 15, 16, 41-50 and 53 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,751,018 to Alivisatos et al. (the Alivisatos patent). The Examiner cited the Alivisatos patent for disclosing self-assembled bifunctional organic monolayers as bridge compounds exposed to solutions of nanocrystals. The Examiner noted that the Alivisatos patent discloses inorganic surfaces such as metals and oxides. However, the

Alivisatos patent does not teach or suggest metal oxide or silicon oxide nanoparticles within self-assembled structures. Thus, the Examiner has failed to assert a case for prima facie obviousness. Appellants respectfully request reconsideration of the rejection based on the following comments.

Group 2

In response to Appellants' arguments during prosecution, the Examiner indicated that "Alivisatos discloses inorganic surfaces using self-assembled monolayers (column 2, lines 36-40) where the intended use of the material comprised in the substrate is of little consequence, as intended use is given little patentable weight in product claims." See final Office Action at page 5. However, Appellants' argument had nothing to do with intended use. Appellants' arguments related to the **claimed structure** and its non-obvious differences from the Alivisatos **structure**. The Alivisatos patent teaches a substrate on which particles are attached. However, the particles are taught in the Alivisatos patent to be sulfide particles, such as cadmium sulfide, and only sulfide particles. The Alivisatos patent simply does not teach, suggest or motivate metal oxide particles, and certainly does not teach metal oxide particles having a particle size of less than 100 nanometers. The Alivisatos patent teaches bonding of cadmium sulfide particles to metal oxide **surfaces**, but this has nothing to do with metal oxide **particles**. The Alivisatos patent does not motivate particles of the type claimed by Appellants and does not provide a reasonable expectation of success. Since the Alivisatos patent does not teach or suggest all of the claim elements (nanoparticles of metal/silicon oxides, metal/silicon carbides, metal/silicon nitrides and elemental metal), the Alivisatos patent does not render claims 15, 46-48 and 50 prima facie obvious. In addition to not teaching or suggesting these types of particle, the Alivisatos patent furthermore does not motivate these particles and does not provide a reasonable expectation of success with respect to these particles.

Since the Alivisatos patent does not teach, suggest, motivate or provide a reasonable expectation of success with respect to Appellants' claimed invention, the Alivisatos patent does not render the claim of group 2 prima facie obvious.

Group 3

The Alivisatos patent does not teach or suggest uniform particles of metal/silicon oxides, metal/silicon carbides, metal/silicon nitrides and elemental metal. In addition, the Alivisatos patent does not motivate these uniform particles and does not provide a reasonable expectation of success. With respect to particle uniformity, the Examiner merely indicates that this is a property "that can be easily determined." But not all particle collections are this uniform. The Alivisatos patent certainly does not provide a reasonable expectation of success with respect to forming uniform particles of the claimed composition with this extremely high level of uniformity. Uniformity of nanoparticles is far from being a matter of routine optimization since there is no known way to select for this uniformity. Since the Alivisatos patent does not provide a reasonable expectation of success with respect to these uniformities, the Examiner has not established prima facie obviousness of claim 16 and 45.

Group 4

Claims 41 and 42 depend from claim 1. However, the Examiner has grouped these claims with independent claim 15. Appellants have previously overcome an assertion of obviousness of claim 1 over the Alivisatos patent. See, Appeal Brief of July 7, 2003 and the office action of October 27, 2003. Therefore, it is clear that the Examiner has not come close to properly asserting a case for prima facie obviousness of claims 41 and 42. Perhaps, this rejection was in error. Furthermore, it is clear that the Alivisatos patent does not teach a plurality of self-assembled structures with the claimed properties specified in claim 1.

Group 5

Claim 43 also depends from claim 1. The comments with respect to group 4 claims 41 and 42 apply equally with respect to claim 43. Perhaps, this rejection was also in error. Furthermore, the Examiner has not asserted an ordered array in at least one of the self-assembled islands. It is clear that the Examiner has fallen far short of establishing prima facie obviousness of claim 43.

Group 6

With respect to claim 44, the Examiner has not asserted that the Alivisatos patent teaches self-assembled structures along different layers, and the Alivisatos patent clearly does not teach, suggest or motivate such structures or describe a way to make such structures. Such structures are shown for example, in Applicants' Fig. 8. Since the Alivisatos patent clearly does not teach, suggest or motivate self-assembly in different layers, the Alivisatos patent clearly does not render claim 44 prima facie obvious.

Group 7

With respect to claim 49, the Examiner has not asserted that the Alivisatos patent teaches a formation forming an integrated assembly, and the Alivisatos patent clearly does not teach, suggest or motivate a self-assembled formation forming an integrated assembly. Since the Alivisatos patent clearly does not teach, suggest or motivate an integrated assembly of a plurality of self-assembled structures, the Alivisatos patent clearly does not render claim 49 prima facie obvious.

Group 8

With respect to claim 53, the Examiner asserts that the Alivisatos patent teaches equivalent materials such that a photonic band gap material necessarily follows. Referring to Appellants' specification, for example, at page 43, lines 19-32, a photonic crystal involves an ordered array with various properties. The Alivisatos patent does not teach a plurality of

structures required to form a photonic crystal or ordered arrays necessary to form a photonic crystal. Since the Alivisatos patent clearly does not teach, suggest or motivate structures necessary to form a photonic crystal, the Alivisatos patent clearly does not render claim 53 prima facie obvious.


Summary of Rejections Over Alivisatos

Since the Alivisatos patent does not teach, suggest or motivate metal oxide particles, the Alivisatos patent clearly does not render Appellants' claimed invention prima facie obvious. With respect to claim Groups 3-8, the Alivisatos patent clearly fails to teach, suggest or motivate specific features of these claims or provide a reasonable expectation of success, as discussed above in detail. Appellants respectfully request withdrawal of the rejection of claims 15, 16, 41-50 and 53 under 35 U.S.C. § 103(a) as being unpatentable over the Alivisatos patent.

CONCLUSIONS

Appellants submit that claims 1, 8-10, 12, 14-16, 41-50 and 53 are patentable over the references of record. Appellants assert that the Examiner has clearly failed to establish or come close to establishing prima facie unpatentability of any of the claims. Thus, Appellants respectfully request the reversal of the rejections of claims 1, 8-10, 12, 14-16, 41-50 and 53 and the allowance of all pending claims.

Respectfully submitted,



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Peter S. Dardi
Peter S. Dardi

APPENDIX A

PENDING CLAIMS

1. A material having a layer, the layer comprising a plurality of self-assembled structures comprising compositions, wherein the structures are localized in separate, selected locations covering a portion of the layer in an integrated assembly and wherein the compositions comprise inorganic particles.

2.-3. (Canceled)

4. The material of claim 1 wherein the inorganic particles have an average secondary particle diameter from about 2 nm to about 200 nm.

5. The material of claim 1 wherein the inorganic particles have an average secondary particle diameter less than about 100 nm and the primary particles having a distribution in sizes such that at least about 95 percent, of the primary particles have a diameter greater than about 40 percent of the average diameter and less than about 160 percent of the average diameter.

6. The material of claim 1 wherein the particles include effectively no primary particles with a diameter greater than about a factor of four times the average particle size.

7. The material of claim 1 wherein the particles have an average secondary particle diameter less than about 100 nm, the particles being located within pores of a material in the layer.

8. The material of claim 1 wherein the particles comprise a metal oxide.

9. The material of claim 1 wherein the compositions are attached to the surface with a linker molecule.
10. The material of claim 9 wherein the linker molecule comprises an organic compound with two functional groups.
11. The material of claim 1 wherein the particles are fluorescent particles or phosphorescent particles.
12. The material of claim 1 wherein the composition comprises a metal.
13. The material of claim 1 wherein the composition comprises a biological macromolecule.
14. The material of claim 1 wherein the composition comprises silica.
15. A material comprising a self-assembled formation of inorganic particles, the inorganic particles having an average primary particle diameter less than about 100 nm and the particles comprising a composition selected from the group consisting of metal/silicon oxides, metal/silicon carbides, metal/silicon nitrides and elemental metal.
16. The material of claim 15 wherein the primary particles have a distribution in sizes such that at least about 95 percent of the primary particles have a diameter greater than about 40 percent of the average diameter and less than about 160 percent of the average diameter.

17-40. (Canceled).

41. The material of claim 1 wherein the inorganic particles have an average primary particle diameter from about 2 nm to about 100 nm.

42. The material of claim 1 wherein the inorganic particles have an average primary particle diameter from about 12 nm to about 50 nm.

43. The material of claim 1 wherein the particles are in an ordered array within at least one of the self-assembled islands.

44. The material of claim 1 wherein the plurality of islands are located along different layers within the material.

45. The material of claim 15 wherein effectively no primary particles have a diameter greater than about a factor of four times the average primary particle size.

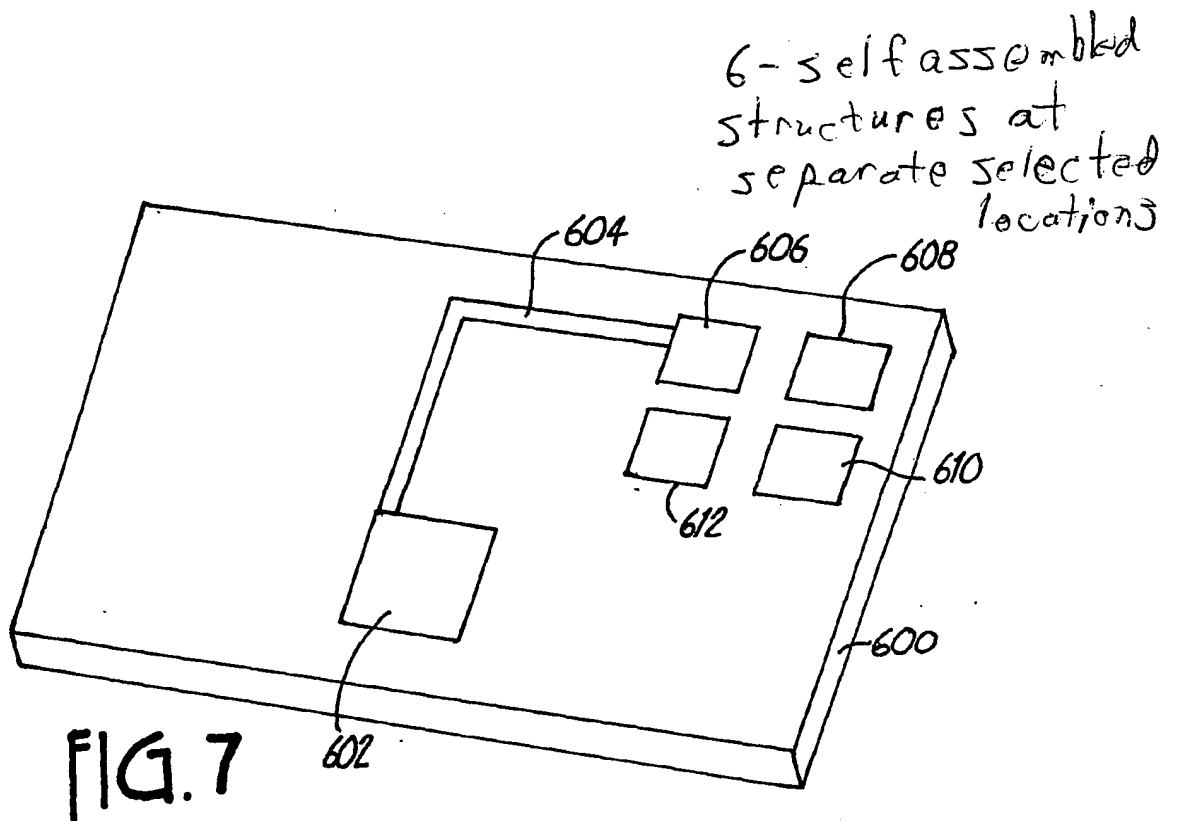
46. The material of claim 15 wherein the inorganic particles have an average primary particle diameter from about 2 nm to about 50 nm.

47. The material of claim 15 wherein the inorganic particles have an average secondary particle diameter from about 20 nm to about 400 nm.

- 48. The material of claim 15 wherein the inorganic particles are in an ordered array within the self-assembled formation.
- 49. The material of claim 15 wherein the self-assembled formation is integrated into an integrated assembly.
- 50. The material of claim 15 wherein the inorganic particles comprise a metal oxide.
- 51. The material of claim 15 wherein the inorganic particles comprise a phosphor composition.
- 52. The material of claim 15 wherein the inorganic particles comprise a material with an index of refraction suitable for transmitting visible light.
- 53. The material of claim 15 wherein the self-assembled structure has a photonic band gap that prevents propagation of light in any direction.

APPENDIX B

Annotated Fig. 7



Self-assembled structures
602 → 604 + 606 are
clearly integrated.